Appendix to June 22, 2016 Request for Dispute Resolution
Portland Harbor Superfund Site
USEPA Docket No: CERCLA-10-2001-0240

SDU and Upland Site Specific Issues for Disputes

In addition to the issues raised for dispute by the Disputing Respondents, there are several errors in the FS to specific locations within the site. Set forth below are some of those issues that are specifically related to sediments, riverbanks, or groundwater at or near Disputing Respondents' facilities.

Arkema

The following briefly describes some of the key dispute issues related to the Arkema Site.

1. Riverbank contaminants adjacent to the Arkema Site

EPA added sites and edited the discussion of riverbanks and groundwater in Section 1 of the FS. Based upon our preliminary review, the identification and presentation of these sites contain multiple errors. For example, PCBs are listed as a riverbank contaminant at Arkema, but have only been detected in a small number of samples below the applicable screening levels (with one exception, one sample slightly exceeded a conservative bioaccumulative SLV). Two key issues are: (1) risk-based PRGs should not be established based on exposure pathways being evaluated as part of the upland source control evaluations under DEQ, and (2) that none of these upland media were evaluated in the BLRAs or RI. EPA's use of sediment PRGs for riverbanks, which were applied to areas rarely inundated by the river and without considering fate and transport (e.g., attenuation), is technically unsupportable and inappropriate. Delineations of groundwater plumes and riverbanks, and a zero post-construction restoration timeframe are unsupportable.

There is a lack of data and analysis as to what risk considerations are driving the specific remedial actions (and therefore how such analyses will be refined in the design phase when further data/analysis is available) and what specific remedial actions will be implemented in which areas driven by such risks. This opaque delineation is then carried into the evaluation of alternatives and used to assess the relative effectiveness of alternatives. This appears to significantly bias the outcome of alternative selection.

The June 2016 FS fails to include a discussion of upland source controls that have been implemented as well as failing to include anything related to the performance of source controls in the remedial evaluations.

Source control measures taken at the Arkema Site have largely eliminated the stormwater pathway from this site. Groundwater controls, namely the installation of a slurry wall and a groundwater extraction and treatment system designed to prevent migration from the uplands to the river, have eliminated the groundwater pathway.

2. Principal Threat Waste adjacent to the Arkema Site

EPA inappropriately identifies chemicals in sediment adjacent to the Arkema Site as PTW based on either a "source material," "not reliable contained," or "highly toxic" criterion. Source material has never been identified in Arkema Site sediment, EPA should not identify chemicals that can be reliably contained as PTW, and chemicals that require long-term exposure durations through indirect exposure pathways (*i.e.*, consumption of fish tissue) should not be identified as "highly toxic." In addition, the

blanket identification of large areas with low concentrations of chemicals in sediments as PTW is neither required by the National Contingency Plan (NCP) nor necessary to protect public health or the environment.

EPA errs when it misidentifies source material based on "globules or blebs of product in surface and subsurface sediments…" and when it states that "NAPL observed in sediment cores offshore of Arkema contains chlorobenzene and DDT (dissolved)." Arkema responded to CDM Smith's 2013 memorandum (Attachment Ark-1) that purports to identify NAPL at the Arkema Site. To resolve the issue, Arkema prepared a work plan in response to EPA requests under the EE/CA Administrative Order on Consent (AOC) to confirm that NAPL was not present in sediment adjacent to the Arkema Site (Integral 2016). In addition, no samples offshore of the Arkema Site have identified the presence of an MCB DNAPL. There is no data that supports EPA's statement that NAPL observed in Arkema sediment "…contains chlorobenzene…." Significantly, a document titled "Top 10 State Issues for Proposed Plan" obtained from the LWG's Freedom of Information Act (FOIA) request identified that based on Oregon DEQ's review of the data "The multiple phases of sediment investigation have not encountered sediment exhibiting NAPL saturated conditions that would warrant thermal treatment prior to management." The status column for the same issue states that "EPA agreed to not assume NAPL at Arkema for the purposes of the cost estimate" (Attachment Ark-2). Based on these records, we conclude that EPA and DEQ agreed that there was no chlorobenzene NAPL in offshore sediments, and therefore the assertion that such sediments represent PTW Source Material as defined by EPA's PTW fact sheet is without foundation, acceptance, or support.

EPA also erred when it identified an extensive area of groundwater containing chlorobenzene DNAPL discharging to the river as "not reliable contained" (Attachment Ark-3). In fact, there is no documented MCB DNAPL groundwater plume. EPA's Figure 3.2-4, adjacent to the Arkema Site, is inaccurate and misleading. The nature and extent of chlorobenzene DNAPL in groundwater and/or sediment pore water as shown in this figure is not based on actual site data. Groundwater SCMs have been implemented at the site beginning in 2012, including an upland groundwater barrier wall and extraction and treatment system. The groundwater pathway to the river from upland areas where chlorobenzene DNAPL may have been present in upland groundwater has been isolated from site sediments. Containment has been in existence for nearly four years.

There is no scientific evidence that supports the existence of an ongoing source of MCB DNAPL to the sediment adjacent to the Arkema Site. Groundwater and pore water sampling conducted after the implementation of the SCM has not identified a MCB DNAPL source to sediment adjacent to the Arkema Site. This site characterization error which postulates an extensive area of chlorobenzene DNAPL in sediment at the Arkema Site biases the assessment and comparison of the effectiveness of alternatives as evidenced from the following text: "Alternative D has less capped area (71 acres), but does not reliably contain all PTW remaining in the river." (USEPA 2016, p. ES-15). Without an accurate assessment of PTW and PTW areas (in this case, DNAPL), EPA's alternatives evaluation is highly inaccurate.

EPA also errs when it misidentifies areas of the Arkema Site (including certain areas upstream and downstream of Arkema; Attachment Ark-3) as containing "highly toxic" PTW based on surface sediment concentrations for DDx, 2,3,7,8-TCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PeCDD, 2,3,4,7,8-PeCDF, and 1,2,3,4,6,7,8-HxCDF that exceed a 10^{-3} excess cancer risk level for fish consumption based on the fish ingestion risks from the baseline human health risk assessment (BHHRA). This definition of highly toxic based on a long-term (30-year) exposure to a chemical substance via a fish consumption pathway is not consistent with the intent of EPA's PTW fact sheet. These 10^{-3} risk levels include long-term exposure parameters and indirect exposure based on a 30-year subsistence fish consumption scenario, which does not meet the definition of highly toxic (*i.e.*, toxic under a direct contact or acute exposure scenario). Highly toxic levels should be based on direct exposure conditions only. Furthermore, the 10^{-3} excess cancer risk is only a suggested basis and is not prescriptive.

The EPA's proposed highly toxic PTW levels should also be considered in a broader context. EPA's highly toxic PTW values for some constituents are well below cleanup levels and screening level for unrestricted use established for other sites and scenarios. For example, the PCB PTW value of 200 µg/kg is below cleanup goals for many other CERCLA sites, which are at or above 200 µg/kg. The EPA regional screening level (RSL) for residential soil in fact is 249 µg/kg; in other words, soil/sediment with PTW levels specified in the FS could be used as clean fill at homes, schools, and day care facilities. In this context it does not make sound technical or risk management sense for the PTW level to be set at 200 µg/kg. An approach more consistent with the intent of EPA's PTW guidance would be to set the PTW level at a 10^{-3} risk value based on direct contact to sediment (removal action objective 1 [RAO1]); that would be the lower of the 10^{-3} risk level (370,000 µg/kg), the hazard quotient (HQ) of 10 (147,600 µg/kg) (as stated in the guidance), or for the PCB case, the TSCA waste threshold (50,000 µg/kg). The use of the TSCA threshold for PCBs is also consistent with decisions at other CERCLA sites. A similar approach should be taken for the other constituents for which highly toxic PTW has been identified, especially dioxins/furans for which the PTW level in the FS is less than 3 times the EPA-recommended preliminary remediation goals PRG for dioxins/furans (once toxicity equivalence factors (TEFs) are applied).

3. Flawed evaluation used to determine whether PTW can be reliably contained

There is no scientific support for the assertion that there is NAPL or PTW in the sediments adjacent to the Arkema Site. According to EPA, PTW is a concept used in the NCP to characterize contaminant source material (USEPA 1991). PTWs are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. In the 1991 guidance, EPA stated their expectation that PTW would be treated, wherever practical, because of current technical limitations of long-term reliability of containment technologies. The long-term reliability of containment of certain NAPL PTWs has improved through the development and implementation of reactive capping, as demonstrated by EPA (USEPA 2013). The draft final FS does consider and propose reactive capping but uses a flawed screening analysis to limit its use by designating certain SMAs as PTW NAPL/NRC, reflecting those areas where purported NAPL is deemed not reliably contained (NRC). Furthermore, the draft final FS is not consistent with the EPA guidance on principal threat and low-level threat wastes (LTW) (USEPA 1991), as it does not differentiate PTW from LTW NAPL based on toxicity, mobility, and (realistic) reliability of containment, but uses NAPL and PTW interchangeably. For instance, for shallow areas it states that NAPL or PTW that is not reliably contained within an SMA would be dredged to the lesser of the RAL concentrations or 15 feet.

To determine the boundary for where PTW can be reliably contained, two limited capping options were modeled in Appendix D to determine the maximum concentrations of PTW material that would not result in exceedances of AWQC in the sediment cap pore water after a period of 100 years. Contaminants modeled were chlorobenzene, dioxins/furans, DDx, naphthalene, PAHs, and PCBs. Appendix D contains the following errors of commission or omission:

- The objectives of the analysis are not clearly defined or stated. The document states "this appendix is evaluating whether or not PTW at the Site can be reliably contained under specific assumptions." What are the assumptions that justify a conclusion that the maximum containable sediment concentrations of chlorobenzene and naphthalene are 320 µg/kg and 140,000 µg/kg, respectively?

- The two potential active cap designs modeled (thickness of capping layers and amount of active material in cap for a reasonably conservative approach and a more aggressive augmented capping approach) are not representative of the current state of practice for reactive capping and so cannot be used to determine the contaminant concentrations that cannot be reliably contained.

- The long term reliability of a reactive cap is a direct function of the thickness of the reactive layer and the amendment(s). A more reliable reactive cap with a thickness greater than 12-inches and consisting of a lower layer of organo-clay and an upper layer of GAC should have been considered in Appendix D.

- Maximum pore water concentration of chlorobenzene used as a continuous source term in the model is based on the relatively old Remedial Investigation (RI) database and is not representative of current conditions, let alone for the next 100 years. In addition, EPA has used data that were not collected pursuant to the RI. EPA has used reconnaissance data collected using a Geoprobe rig. The data are unacceptable for, and cannot be used to represent, pore water chlorobenzene concentrations. Therefore, the maximum pore water concentration EPA used is based on inappropriate data and needs to be replaced in the model. Since the RI data collection, a barrier wall and pump-and-treat system have been installed along the shoreline of the Arkema Site. Furthermore, maximum data are not appropriate for assessing engineering performance, including reliability. A more appropriate input parameter is the 90th percentile concentration.

- A range of seepage velocities (0.3, 3, and 30 cm/day) were evaluated, representing the minimum, average, and maximum values measured at the Site. However, actual seepage velocities in SMA 7W are likely lower than 0.3 cm/day due to presence of the barrier wall and pump-and-treat system.

4. Inappropriate waste designation for sediments adjacent to the Arkema site

The assumed areas for disposal of sediment as RCRA waste (Figure 3.4-35, Attachment Ark-4) are based on a single toxicity characteristic leaching procedure (TCLP) sample for lead[55] and no TCLP samples for chromium. Based on sediment analytical results, the area shown on Figure 3.4-35 does not represent sediment that will require RCRA Subtitle C landfill disposal. The State-listed pesticide residue designation also does not necessarily apply to sediment at the Arkema Site (Figure 3.4-36, Attachment Ark-4). As recently as February 2016, DEQ was researching the issue of whether sediment near Arkema would be designated a State-listed pesticide waste. Item 3 of the "Top 10 State Issues for Proposed Plan" document obtained from the LWG's FOIA request (Attachment Ark-2) states that "Sean needs State determination of State-only pesticide question, which Matt is researching." However, even if it is determined that some portion of the sediment is a State-listed pesticide residue waste, it would not preclude the placement of this sediment in a CDF (see HWIR discussion below) or disposal in a Subtitle D landfill out of state. When a State-listed hazardous waste is transported out of state (for example, to the Roosevelt Regional landfill as presented in the FS), the Oregon State waste designation no longer applies, and the waste can be disposed as a non-hazardous waste so long as it meets other landfill disposal criteria. This was recently demonstrated by the disposal of soil from the Arkema Stormwater and Groundwater SCMs, at the RCRA Subtitle D Roosevelt landfill in Washington.

Arkema disagrees with the cost assumption that "cement solidification/stabilization, low temperature thermal desorption, and no treatment will be used in equal proportions to treat pesticide/chlorobenzene PTW" for the disposal of dredged sediment that meets EPA's PTW criteria from the Arkema Site. Notwithstanding the fact that there are no PTW sediments currently identified off the

[55] The analytical results minimally exceeded TCLP regulatory limits for lead in this sample. We note that the TCLP samples were collected from specific intervals from single boreholes and were not necessarily representative of the general area around these boreholes. As perhaps a more appropriate approximation representative of bulk sediments, drummed sediments that contained the referenced sample intervals were re-sampled and analyzed for TCLP to evaluate the disposal options for these sediments, and none of those re-sampled drums exceeded the TCLP concentrations.

Arkema Site, the FS fails to clearly outline the basis for EPA's assumptions regarding treatment as a prerequisite for offsite disposal. Section 3.2.2.3 fails to clearly identify specific regulations and the conditions under which they are assumed to apply, or not apply, to sediments that are designated as PTW and the mechanism under which they derive need for treatment prior to offsite disposal. Furthermore, the "Top 10 State Issues for Proposed Plan" document obtained from the LWG's FOIA request (Attachment Ark-2) states that "DEQ wants to be clear that land disposal of these sediments does not require treatment under Oregon Administrative Rules." As presented, EPA has arbitrarily made more conservative assumptions for disposal of PTW defined by sediments purportedly containing DDx and NAPL than it has for PCBs, dioxin/furans, and PAHs.

5. Inappropriate application of the Hazardous Waste Identification Requirements (HWIR) Rule for disposal of sediment in a CDF

EPA asserts that "Dredged material subject to requirements of a permit that has been issued under Section 404 of the CWA is excluded from the definition of hazardous waste (40 CFR 261.4(g)). This provision is discussed in the Hazardous Waste Identification Rule (HWIR) (63 Federal Register [FR] 65874, 65921; November 30, 1998). Oregon State adopted the HWIR rule in 2003. This rule means that RCRA regulatory requirements do not apply to sediment dredged at the Site and disposed of on-site, such as at the Terminal 4 CDF, if the material otherwise meets the CDF acceptance criteria." (emphasis added)

EPA has correctly stated that RCRA regulatory requirements, including the designation of waste sediment as either a Federal or State-only hazardous waste, do not apply to sediment placed in a CDF; however, the statement mischaracterizes the CWA requirement that the sediment must meet CDF acceptance criteria for this rule to apply. This is not the case. Because DEQ has adopted the federal HWIR rule, and the CDF would meet CWA Section 404 requirements, RCRA Subtitle C requirements would not apply, and the dredged material placed in the CDF would not be a hazardous waste. The disposal of Arkema sediment in a Terminal 4 CDF should, therefore, be considered. The failure to consider CDF disposal for Arkema dredged sediment artificially inflates the disposal costs for alternatives related to the dredging at the Arkema Site. EPA disregards the scope and intent of the HWIR Rule by placing arbitrary restrictions on what EPA believes can be placed into the T4 CDF if constructed. All of the EPA's Acceptance Criteria for the T4 CDF are arbitrary and should be removed. Disposal of dredged material should follow the HWIR Rule as adopted by the State. This arbitrary action by EPA has severe negative implications for the FS and any subsequent RA.

6. Inappropriate use of PCB non-detected values in RAL and PTW footprint maps

The RAL and PTW footprint maps incorporate data with high PCB detection limits adjacent to the Arkema Site (Attachment Ark-5). The high PCB non-detects with detection limits 5 times EPA's PTW value (e.g., >1 mg/kg) occurred in the Aroclor analysis as a result of a matrix interference with DDx. The RAL and PTW footprint maps should only consider detected PCBs based on PCB congener concentrations adjacent to the Arkema Site. The identification of PTW and remediation footprints for PCBs adjacent to the Arkema Site based on non-detect values with elevated detection limits resulting from matrix interference with DDx is inconsistent with EPA's PTW guidance and biases the assessment of PTW and remediation footprints for the SDU RM7W alternatives. This exaggerated PCB footprint will also bias the alternative selection for SDU RM7W.

7. Inaccurate RAL and PTW footprint maps

The PCB and PCDD/F RAL and PTW maps were contoured using natural neighbors gridding and did not account for the flow direction or depositional environments in a river system. The RAL and PTW maps in EPA's FS used nearest neighbor interpolation, and data points were inappropriately interpolated

through upland areas. An example of this inappropriate interpolation is between points in the Willbridge Terminal and the area between Dock 1 and the Salt Dock on the Arkema Site (Figures 3.4-7, Attachment Ark-5; 3.4-11, Attachment Ark-6). In this example, the points are not correlated and should not be interpolated through the upland portion of the Arkema site. The RAL and PTW maps must include some interpretation to reflect the physical features of the site and site uplands, as well as the hydrodynamics of a river system.

8. Background concentrations for PCDD/F compounds in sediment

Sediment PRGs for RAO2 and RAO6 as well as riverbank PRGs for RAO9 for the five PCDD/Fs congeners are based on background concentrations. Background PCDD/F concentrations for individual congeners are presented in Appendix B, Table B2-4 of EPA's FS.

EPA uses new methods for deriving these levels that appear significantly different from both EPA's methods for other chemicals as well as past LWG input on this subject. Sediment PRGs for RAO2 and RAO6 as well as riverbank PRGs for RAO9 for the five PCDD/Fs congeners are based on background concentrations.

The background values are based on limited and poor quality data (with elevated detection limits). In fact, only one congener has sufficient data (1,2,3,4,7,8-HxCDF) to calculate a background value and even that is limited (13 of 31 samples were non-detects). Thus, most of the background "values" are based on a 95% UCL of the detection limits. The background values also appear skewed quite low compared to other urban watersheds.

The background values estimated based on this limited data and approach, furthermore, are approximately an order of magnitude lower than values from other regions and watersheds. For example, a memorandum published by EPA in 2010 provides a good summary of background levels for dioxins/furans in sediment, which range from approximately 2–5 parts per trillion (ppt) as TEQs. It also summarizes values from Puget Sound which include a TEQ value of 4 ppt for non-urban areas but allowing up to 10 ppt as TEQs for open water disposal; this value is also used in San Francisco Bay and elsewhere. (https://klamathrestoration.gov/sites/klamathrestoration.gov/files/EPA%20Klamath%20dioxin%20memo%201-13-10%20final.pdf). The Duwamish Waterway FS establishes an upper bound background value for dioxins/furans as 11.6 ppt TEQ.

Background values in other regions and watersheds are expressed as TEQs, which is generally the manner in which cleanup goals for dioxins/furans are expressed. For Portland Harbor, EPA used 5 individual congeners. The individual congener background values provided in Appendix B of the FS and in the PRG tables for RAOs 2 and 6 can be converted to TEQs using TEFs, which results in a value of 0.56 ppt on a TEQ basis (since the 5 congeners equate to the majority of the risk, this value may be slightly biased low, but probably less than 10% of the total TEQ). This background value is an order of magnitude or more lower than the range of values, mainly for non-urban areas, from the literature. A study to better define background levels for dioxins/furans is necessary since the calculated risk-based PRGs are well below even these low-biased background levels resulting in the background values being adopted as the final PRGs. Otherwise, it is unlikely that the remedies for dioxins/furans will be successfully implemented and estimated risk reductions for dioxins/furans will be realized. This latter issue addresses the validity of the alternatives analysis and its biased outcome.

It should also be noted that no background values are listed for RAOs 1 or 3. Those PRGs are expressed as TEQs and data is lacking to identify a background level on a TEQ basis. Those PRGs may be below background. In fact, the PRG for RAO3 is four orders of magnitude below the MCL and is likely not reliably measurable at that level. Overall, providing PRGs that are below MCLs is inconsistent with

other cleanup actions under CERCLA or other programs. Cleanup to below MCLs is unlikely to be achievable.

9. Background Concentrations in other COCs and media

The FS (Section 2.2.2.4) states that only sediment background concentrations were estimated and background concentrations for other media could not be calculated due to insufficient data. However, surface water background concentrations were calculated in the RI. Upriver surface water background concentrations of COCs are orders of magnitude higher than the ARARs based on the AWQC. Note, the background UCLs for upriver surface water (dissolved concentrations with outliers removed; Table 7-4b of RI) vs RAO3 AWQC-based PRGs. For example, the background concentrations and ARARs for DDT, PCBs, and TCDD TEQ demonstrate examples of RAOs that are less than background:

- background UCL for DDT = 0.000114 µg/L and the ARAR (RAO3) is 0.00002 µg/L;
- background UCL for PCBs = 0.000126 µg/L and the ARAR (RAO3) is 0.000006 µg/L; and
- background UCL for TCDD TEQ = 0.000126 µg/L and the ARAR (RAO3) is 0.000000033 µg/L.

Because of the deficiencies in determining the background levels, a new background study for sediment, surface water and tissue needs to be conducted in the design phase. The results of this evaluation need to be used to update PRGs, RALs and SDUs.

10. Benthic risk models do not honor the measured data

EPA made extensive changes to the benthic approach for this FS, but those changes are still inconsistent with the comprehensive benthic risk approach contained in the approved BERA. The FS states: "The protection of benthic species to contaminated sediment is evaluated using the benthic risk area defined by an order of magnitude greater than the RAO5 PRGs. The post-construction interim target for RAO5 was established at 50% reduction in the area posing unacceptable benthic risk." So, instead of using the CBRA, EPA now maps benthic PRG exceedance factors on a point-by-point basis and uses a 10 times exceedance factor to identify areas of concern. EPA then concludes that if 50% of this area is actively remediated, the alternative is "protective" on an interim basis. It is unclear how this new method is: (1) more accurate or consistent with the BERA, or (2) more predictive of benthic risk or the effectiveness of the alternatives, as compared to simply using the CBRAs, which are entirely consistent with the BERA.

Furthermore, and most importantly, the benthic risk models used by EPA do not honor the measured data. Although the LRM and FPM are model predictions using data from the toxicity texts conducted with site sediments, much of the measured data is not considered or addressed in this evaluation. Any modeled risk for benthic invertebrates that ignores actually toxicity testing results needs to be assessed in weight-of-evidence and river-mile specific decision-making. The benthic risk footprints should not extend into areas shown to have a lack of toxicity based on actual laboratory toxicity tests. This error has been carried through the alternatives analysis and therefore has biased the selection of alternatives for SMAs in the FS.

11. Overly prescriptive decision trees

The FS acknowledges uncertainties in site characterization and the conservative assumptions used to form the basis for associated technology assignments, however EPA continues to use a prescriptive set of technology evaluation and scoring criteria to determine the technologies to be applied in each area of the site and, with the exception of a vague paragraph in Section 3.8.1, the FS is silent regarding the degree of

flexibility that is envisioned to be available during remedial design to refine technology assignments based on the additional information gained through future pre-design investigations. This will lead to a lack of flexibility with regard to technology assignments, depth of removal, potential improvements in technology, design efficiencies to address remedial, and CWA/ESA requirements, among other things.

EPA should clearly explain the conditions under which changes to major alternative elements (e.g., changes in technologies assignments, methods to address PTW, methods for determining treatment and disposal requirements, requirements for rigid containment) might be considered or allowed. EPA should explain how new data, including the "initial conditions" assessment, will affect the RAL boundaries based on surface sediment concentrations. The FS should include language to allow for updates to risk assessments. EPA should incorporate decision frameworks for proposing equally or more effective capping options or other technology refinements based on detailed design-level evaluations and new data.

12. Prescriptive dredge residuals management strategy

The prescribed application of 12-inches of sand across the entire dredge footprint (amended with AquaGate+PAC[56] in areas where PTW present) is poorly supported. The FS is misleading in stating that the placement of sand (and GAC in areas where EPA has speculated that PTW is present) immediately following dredging will eliminate the need for additional dredge passes. The FS indicates that sediment cores would be taken post-placement to verify that thin-layer residual cover successfully reduces residuals concentrations. It is inappropriate to assume a 12-inch layer of residuals management cover will be applied across the entire dredge footprint, without providing a strategy that will determine the necessity for thin-layer placement and flexibility to develop an appropriate thickness.

As PAC can be toxic to benthic organisms, overall quantities and where and how it is applied warrants more thoughtful consideration. The FS neglects to consider the physical stability of PAC in the deployment of the thin-layer residuals cover. PAC will be ineffective if it immediately washes away. The FS neglects to consider any possible unintended consequences that may be posed by transport/erosion and aggregation of PAC (with or without adsorbed contamination) in depositional areas. The assumed performance requirements for this residuals strategy are unclear.

13. Inappropriate use of rigid containment technologies

EPA assumes the use of sheet pile barrier walls as dredge water quality control measures based on the suspected presence of NAPL will support the short term effectiveness of all alternatives. The FS still fails to adequately evaluate the implementability, effectiveness, and cost of this particular technology relative to other technologies and BMPs.

In making gross assumptions for this FS, EPA has disregarded the complexity of constructing such barrier walls (e.g., consideration of structural components such as king piles and structural bracing, or more complex cofferdam structures) and the associated impacts this will have on numerous aspects of remedy implementation ranging from construction duration (e.g., time required to install walls, and impacts to dredge production rates) to the overall net benefit and cost effectiveness relative to other means. EPA also continues to show figures that depict sheet piling in greater than 50 feet of actual water depth, which is technically infeasible. These figures also imply that sheet piles will be installed in the navigation channel, which would infeasibly obstruct vessel traffic. Sheet pile would also impact ongoing water dependent

[56] The text makes numerous inappropriate references to specific commercial products (*i.e.*, AquaGate+PAC, Aquablok) as components of the conceptual remedial design. The FS should provide flexibility to consider other commercially products for a given class of technologies.

operations and nearshore fish migration does not evaluate whether sheet piles in the navigation channel could be permitted by USACE.

14. Risk reduction between alternatives

The calculated post-construction risks and HI values are higher than the interim target risks and HI. Because much of the remedy relies on MNR, the lack of a residual risk estimation process for time intervals post-construction (up to year 30) limits the usefulness of the residual risk estimates in terms of comparing the protectiveness of the remedies.

Furthermore, there is very little difference in net risk reduction between Alternatives B and I for almost all COCs. For most of the COCs, the differences are less than a factor of 2 and sometimes much smaller (e.g., difference in HQ of 0.25). Given the very conservative assumptions that were used to calculate PRGs, differences in estimated risks by a factor of 2 or less are not significant. A more reasonable criterion for evaluating differences in estimated risk between alternatives would be a factor of 10, which should be considered the minimum significant difference given the limited sensitivity of these criteria. A probabilistic-type risk evaluation, which incorporates the quantitative uncertainties, would be a more appropriate approach.

This small difference in risk reduction between alternative remedy scenarios is likely due to the driving PRGs being based on background. The risk associated with background levels of COCs should be presented in a side-by-side comparison to the residual risk estimates in order to demonstrate the benefit of the remedial measures to the public. Based on the residual risks presented, any remediation beyond Alternative B (which does show a great degree of risk reduction from Alternative A, no action, than the difference between other alternatives) is unwarranted. The very large increase in costs for minimal and insignificant risk reduction between Alternatives B and I is not recognized in the FS.

In summary, the removal volumes in Alternative I cannot be justified as a cost-effective reduction of risk in comparison to other alternatives. Nor can the use of mixed criteria such as PRGs (and RALs) from different alternatives (*i.e.*, "E" and "F" applied either site-wide or within an SMA) be justified based on differences in risk outcomes that are within an order-of-magnitude.

<u>Evraz</u>

1. **EPA's Feasibility Study improperly imposes more stringent remedial action levels (RALs) in some areas of the site than others.** EPA established a range of RALs based on the distribution of surface sediment contamination. In some areas of the site its preferred alternative (Alternative I) selects "Alternative B+PTW" or Alternative D RALs. However, in other areas of the site, including adjacent to EVRAZ's Rivergate mill, Alternative I selects "Alternative E" RALs. This leaves higher concentrations of PAHs and dioxins in some portions of the river. There is nothing in the FS that describes why, if the "Alternative B +PTW" or Alternative D RALs are protective in some portions of the river, they are not equally protective in other areas. One specific example where the use of Alternative E RALs drives remedial action to a lower concentration than other areas is the remedial footprint near outfall OF53A. It is unclear why additional risk reduction is necessary at this location. For dioxin, sufficient data is not available to support such a decision. EVRAZ believes the FS is flawed in applying different levels of protectiveness, and that its site should similarly be remediated to "Alternative B+PTW" RALs.

2. **Failure of FS to account for riverbank remedial actions already implemented, with EPA's approval.** The FS is based on inaccurate information in that it ignores that EVRAZ already implemented a riverbank remedial action for its Rivergate property, a remedial action based on a

source control decision made by the Oregon Department of Environmental Quality and concurred with by EPA. Assumed riverbank cleanup extents are used in the overall protectiveness determination and without basis.

3. **Inadequacy of "groundwater plume" conclusions.** In addition to the concerns raised in the main text of the document, EVRAZ disputes the following issues with respect to EPA's description of what it depicts as a "groundwater plume" adjacent to EVRAZ's Rivergate property.
    a. For arsenic, this should not be a plume as concentrations in beach groundwater are within the range of or below site background values, do not exceed benthic toxicity criteria and groundwater discharges do not adversely affect the water column.
    b. For manganese, this should not be a plume at all because it does not include site-specific hardness for ecological values and the basis for the human health PRG is application of tap water Regional Screening Levels (RSLs) for manganese in groundwater. As explained in the main text of the document, RSLs are not appropriate PRGs for groundwater in these circumstances.
    c. The exposure pathway of concern is in the surface water to which the groundwater discharges. Surface water concentrations here meet the surface water PRG for manganese.
    d. Groundwater plumes are used in the overall protectiveness evaluation and overestimation of plume extent skews the metrics.

<u>Gunderson</u>

1. **Failure to Account for Completed Riverbank Source Control Measures**

The FS ignores Gunderson's extensive source control work implemented under the oversight of the Oregon Department of Environmental Quality (DEQ) under Voluntary Cleanup Agreement No. WMCVC-NWR-94-01 and Consent Order No. LQVC-NWR-13-02, and in accordance with the requirements set out in the DEQ-EPA Portland Harbor Joint Source Control Strategy (JSCS; DEQ, 2005). Gunderson has implemented permanent riverbank source control measures at some riverbank areas that are identified by EPA as needing remediation. Gunderson has also completed interim source control measures under DEQ oversight at the remainder of the riverbank areas that are identified by EPA in the FS and agreed with DEQ that additional permanent measures will be implemented concurrent with the adjacent in water remedy.

2. **"Groundwater Plume" Conclusions Are Inaccurate and Contradictory to Conclusions of the RI**

The FS depicts two groundwater plumes (referred to herein as the "Southeast Plume" and the "Northwest Plume") adjacent to Area 1 of the Gunderson facility. Gunderson disputes the following issues with respect to the EPA-depicted groundwater plumes.

    a. EPA provides no clear rational for depicting the locations and extents of the plumes at the Gunderson facility (and elsewhere in the Portland Harbor).

    b. During extensive investigations conducted under DEQ oversight, there has never been any evidence that the so-called Southeast Plume exists now, or ever approached anywhere near the river either before or after it was subjected to remediation by sparging.

    c. The depiction of the Northwest Plume is contradictory to the conclusions of the EPA-approved RI, "*The data suggest that ongoing migration of the chemicals to the TZW via groundwater discharge does not contribute to significant concentrations of COIs in nearshore TZW sediments*."

d. The Northwest Plume was delineated because VOC concentrations in near shore TZW exceeded human health screening levels based on the ingestion of Willamette River water. TZW remediation standards based on the consumption of Willamette River water are not appropriate.

e. The contaminants detected in a small area of transition zone water have not been detected in surface water.

f. The December 2007 Round 3 Groundwater Pathway Assessment Field Sampling Report for Stratigraphic Covering – Gunderson, Prepared for the Lower Willamette Group and submitted to EPA by Integral Consulting concluded that "the stratigraphic information does not indicate a conductive pathway for any remnant TCA plum…. On November 8, 2007, EPA indicated to the LWG Management Team that the agencies concurred that the stratigraphic information did not indicate the need for follow-up TZW sampling."

g. The analytical data that serve as the apparent basis for EPAs delineation of the Northwest Plume were collected more than ten years ago. VOCs in upland groundwater have exhibited long-term decreasing trends, even prior to active treatment, which began in 2007. Based on these trends and the low residual concentrations of VOCs in groundwater, DEQ authorized deactivation of the groundwater treatment system for this plume in 2014. There is no evidence that it posed any current threat to sediments or porewater.

NW Natural

On September 27, 2012, EPA provided a preliminary set of comments on the Gasco EE/CA stating that "any comments provided on the Gasco EE/CA are preliminary as the Gasco EE/CA is so heavily dependent on the Portland Harbor draft FS…. Therefore, comments provided on the Portland Harbor draft FS may also need to be addressed in the Gasco EE/CA." Pursuant to EPA's February 4, 2016 agreement with the Lower Willamette Group, EPA is finalizing the Portland Harbor FS rather than providing comments. Many of the modifications EPA has made in the June 2016 FS are inconsistent with the terms of the Gasco Consent Order and with the information, analyses and conclusions of the Gasco EE/CA.

1. *Risk Reduction and Risk Management*. In the September 9, 2009 Administrative Settlement and Agreement and Order on Consent for the Gasco Sediments Site (the "Gasco Consent Order"), EPA and NW Natural specifically agreed to use risk management principles and the results of the harborwide risk assessment to define areas for and approaches to cleanup that are based on significant risk reduction.

> "This SOW's goal is to design a remedy consistent with the ROD that will reduce key human and ecological risks cost effectively given Site characteristics, which results in a cleanup that is protective of public health and the environment and meets all federal and state applicable and relevant and appropriate requirements (ARARs). The risk lines of evidence used in the ROD will guide risk management for the Gasco Sediments Site. The design will also use a risk management framework consistent with EPA guidance (EPA 2005 and EPA 1988) on developing sediment remedies and specifically recognizes the risk management goals for the project throughout the evaluation and design process. The risk management related approaches that are specifically important to this project and are consistent with guidance include:
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> - The Gasco Sediments Site cleanup boundary will be consistent with Portland Harbor EPA approved BLRA.

- Evaluate remedial alternatives with regard to total net risk reduction within the overall framework of the NCP remedy selection criteria.
- Use the Portland Harbor risk assessment protocols, procedures, data, and outcomes whenever possible to set clean up boundaries and evaluate risk reduction, unless use of these would cause an unacceptable delay to the Gasco Sediments Site remediation."[57]

As more fully described in the LWG's comments on the EPA August 2015 draft FS and the main text of this document, EPA's FS is not consistent with either the approved baseline risk assessments for Portland Harbor or a risk management approach focused on the reduction of key human and ecological risks at the site. In particular, NW Natural objects to EPA's use of TPAH RALs and PRGs, the use of which are inconsistent with the findings of the approved BHHRA and BERA, are technically unsupported, and result in significant mass removal unrelated to any measurable reduction in risk.

cPAH PRGs and RALs (expressed as BaPEq) were developed under EPA oversight for the LWG's March 2012 draft FS and were used in NW Natural's March 2012 draft Engineering Evaluation and Cost Analysis for the Gasco Sediments Site (the "Gasco EE/CA"). BaPEq is consistent with the methods and results of the Portland Harbor BHHRA, which were assessed in terms of total cancer risk from cPAHs on a BaPEq basis. The risk-based approach called for in the guidance[6] specifies that RALs should be consistent with the methods and findings of the BLRAs to ensure that sediment remedies are "risk-based" (i.e., result in effective risk reduction). The EPA June 2016 FS itself is consistent with this and expresses all human health PAH PRGs as BaPEq. Therefore, use of BaPEq RALs clearly allows for a direct comparison on a consistent basis between the RALs and the PRGs. Using TPAH RALs does not allow for a direct relationship between RALs and PRGs. In fact, using a TPAH PEC for protection of benthic exposure is not only inconsistent with the approved BERA but is particularly inappropriate for the Gasco sediments site, where NW Natural has invested considerable effort and expense (under EPA oversight) in evaluating the multiple lines of evidence approach defined in the Gasco Consent Order as the basis for identifying areas requiring active remediation consistent with the BLRAs.[58]

NW Natural further objects to the application of TPAH (or BaPEq) RALs within the navigation channel. cPAH risks related to sediment direct contact and shellfish consumption exposures occur only outside the navigation channel (along the shoreline), and as a result, BaPEq RALs associated with these potential risks should be applied in exposure pathway areas only. Although some potentially unacceptable cPAH risk from fish consumption was identified in the BHHRA, EPA was unable to develop any valid relationship between cPAH fish tissue and sediment concentrations at the Site, or any other sediments site, due to the rapid metabolism of PAHs by vertebrate fish.[59] Carcinogenic PAHs represent less than 1% of the cumulative risks to people eating fish and are, therefore, not a technically valid reason to significantly expand the remedy on the basis of a technically inappropriate PRG, given that there is no reasonable expectation that such an expansion could have any meaningful impact at all on the overall fish consumption risk. It is critical to note that if the shellfish consumption PRG EPA has proposed to use as a surrogate for fish consumption were applied at the same fish exposure scale as EPA used in the BHHRA (whole river mile rather than one-third transect river mile), all remedial alternatives (other than no action) evaluated in the Gasco EE/CA would attain the PRG without application of TPAH or BaPEq RALs in the navigation channel.

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[57] Gasco Consent Order SOW §2.3, p. 5-6.
[58] *See, e.g.*, Gasco Consent Order SOW, pp. 19, 31
[59] See *LWG Comments on Revised FS, Section 2* (June 19, 2014), *LWG Comments on Revised FS Section 2* (March 25, 2015); *LWG Responses to EPA's Responses to LWG Comments on Feasibility Study Revised Draft Section 2 Text* (April 23, 2015) (all within Attachment 1) for additional details and references.

TPAH or BaPEq RALs can only be linked to effective risk reduction along the shoreline (using the BHHRA findings and the resulting appropriate PRGs for sediment direct contact and shellfish consumption). If inappropriately applied to the navigation channel, where the risk pathway does not exist, the remedy would cost perhaps hundreds of millions of dollars more, yet result in no additional risk reduction. These RALs should therefore only be used only along the shoreline outside of the navigation channel where the exposure pathway is complete. The multiple lines of evidence (LWG Comprehensive Benthic Risk Area) approach outlined in the Gasco Consent Order and consistent with the BERA is appropriate for protection of ecological receptors and NW Natural respectfully requests that it be used by EPA for remedial decisions in that area.

2. *Future Source Material*. EPA's identification of "globules or blebs" of NAPL as "source material" constituting "principal threat waste" (PTW) at the Gasco Sediments Site[60] is inconsistent with the more specific definition of "potential future source of risk material" in Section 3.2 (RAO 1) of the Gasco Consent Order Statement of Work through the delineation of "substantial product."

Section 3.6.2.1 of the Gasco SOW states:

> "Areas with substantial presence of product in sediments is a line of evidence related to potential mobility of chemicals in the future, and thus related to risks identified in the BLRA. Visual observations in sediment cores shall be the primary parameter used for this line of evidence. As noted above, the term "substantial" product is intended to 1) target product that is related to potential future mobility and 2) indicate a preference for removal as defined by RAO #1. The definition of substantial product does not include every incidence of product observation at the site."[61]

Section 3.6.2.1 goes on to provide more than a page of detail on the precise physical characteristics of material that EPA will consider sufficiently mobile to constitute source material. Based upon this definition, NW Natural has conducted multiple field investigations at a cost of several million dollars to delineate the location of "substantial product" at the Gasco sediment site. These investigations were used to complete detailed and site-specific remedial alternative evaluations in the Gasco EE/CA.

The June 2016 FS does not explain why EPA has apparently abandoned the more specific and technical definition of "substantial product" in favor of "globules and blebs" or why "globules and blebs" is a superior approach for identifying material that presents a significant source of future risk. In the absence of any technical justification, and given the substantial resources NW Natural has put into complying with EPA's original direction on the identification of potential future source material, EPA's change of course is arbitrary and capricious.

NW Natural respectfully requests that EPA abide by the more specific and technically sound definition of "substantial product" contained in the Gasco Consent Order.

3. *Remediation Waste*. EPA's June 2016 FS identifies a category of remediation waste called "Waste or Media Containing Waste that May Warrant Additional Management."[62] EPA states that "Waste with this designation may be specially managed as a non-hazardous waste at a Subtitle C facility based on the exceedance of TCLP criteria for MGP-related constituents and/or special considerations

[60] EPA June 2016 draft final FS p. 3-3
[61] Emphasis added.
[62] EPA June 2016 draft final FS at p. 3-29.

such as worker safety and equipment decontamination. However, if the material is treated and TCLP criteria are no longer exceeded after treatment, it may be disposed of in a RCRA Subtitle D facility."[63]

NW Natural agrees that MGP-related remediation waste that exceeds TCLP criteria at the time it leaves the site will be disposed of as non-hazardous waste at a Subtitle C facility. This material is identified as "Special Waste" under the Gasco Consent Order.[64] To the extent, however, that EPA's June 2016 FS indicates that it may require MGP-related remediation wastes that do not exceed TCLP criteria to be disposed of at a Subtitle C facility based on other "special considerations," that requirement would be inconsistent with the Gasco Consent Order, which provides

> "The method to determine that MGP-related material should be managed as a Special Waste shall be based on the absence of TCE and associated CVOC chemicals and exceedance of TCLP criteria for any MGP-related constituent. If TCLP criteria are exceeded at the time the material leaves the Site, then the material shall be designated Special Waste and transported to a Subtitle C facility. If not, the material would be disposed of as Cleanup Material at a Subtitle D facility [permitted to accept the material]. This method applies to both untreated and post treatment materials, if treatment is proposed. Consequently, an untreated material may meet this definition, but, upon treatment may be determined to no longer meet this definition. In the event that treatment, including treatment in barges, changes the definition, the material would no longer be designated a Special Waste."[65]

The June 2016 FS goes on to state that EPA is assuming "for FS cost purposes" that Gasco remediation wastes identified as PTW "would exceed the TCLP criteria and would need cement-based solidification treatment prior to disposal in a Subtitle C disposal facility."[66]

NW Natural respectfully requests that EPA clarify that, consistent with the Gasco Consent Order (and text earlier in the same paragraph in the June 2016 FS), material that either does not exceed TCLP criteria or that is treated so that TCLP criteria are not exceeded may be disposed of in an appropriately permitted Subtitle D facility.

4. *Site-Specific Technology Assignment and Evaluation*. The Gasco Consent Order provides for evaluation of "a range of technologies including dredging, capping, and Monitored Natural Recovery (MNR). Alternatives will include combinations of technologies that are tailored to the physical, chemical and other conditions of the Site."[67] By contrast, the EPA June 2016 FS assigns prescriptive technologies based upon generalized decision trees. The EPA alternatives do not allow evaluation of the comparative effectiveness of various combinations of technologies applied within the same area of the site – the only difference among the EPA FS alternatives is the size of a single applied technology.[68]

The combination of technologies that will attain the best balance of risk reduction and cost effectiveness at any specific location is highly site-specific.[69] EPA's remedy selection must allow for technology adjustment and refinement through the incorporation of the types of site-

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[63] *Id*.
[64] See Gasco Consent Order SOW at p. 33.
[65] *Id*. Material that contains F002 waste from Siltronic will be managed as a listed hazardous waste and disposed of at a Subtitle C facility.
[66] EPA June 2016 draft final FS at p. 3-29.
[67] Gasco Consent Order SOW, p. 6
[68] EPA June 2016 FS, p. 3-38.
[69] Sediment Guidance, p. 3-2

specific information considered in the Gasco EE/CA but not carried forward into EPA's June 2016 FS. EPA has not provided any rationale for its decision not to import the more refined technology evaluations of the Gasco EE/CA into the FS (or into the Proposed Plan, for that matter). EPA should, at a minimum, clarify how technology assignments will be refined and adjusted during remedial design and implementation. The draft capping demonstration decision tree EPA provided to NW Natural in November 2015, for example, would be an appropriate sort of tool to illustrate how EPA intends to make refinements based on site-specific data or other remedial design information. EPA's decision not to incorporate such tools into the June 2016 FS or the Proposed Plan is a major contributor to our inability to understand EPA's vision for how cleanup will actually be designed and implemented, especially if additional data collection leads to a change in our understanding of site conditions.

NW Natural also objects to EPA's decision to assign remedial technologies at Gasco that ignore the documented performance of the upland hydraulic control & containment system installed under Oregon DEQ oversight and in close coordination with EPA. Similarly, the June 2016 FS provide does not discuss or consider the integration of HC&C system performance data in the future during remedial design.

The Gasco Consent Order clearly states that "cleanup alternatives shall be evaluated in the context of upland groundwater source controls, which will be implemented by this time, including [] reviewing groundwater seepage rate reductions as measured or predicted for upland source control performance[; a]pply the most up to date estimates of groundwater seepage rates and chemical concentrations (as measured or extrapolated) for evaluation of attenuation (i.e, MNR), capping, and dredging alternatives and their long term effectiveness[; and e]valuating attenuation rate predictions for groundwater and TZW that will not be directly remediated by upland source controls."[70] EPA's unexplained retreat from a site-specific, technically sound decision framework that directly accounts for the performance of upland source controls to a generic approach that ignores established fact is arbitrary and inconsistent with the Gasco Consent Order. NW Natural respectfully requests that EPA state that technology assignments can be reevaluated during design in a manner that includes comparative effectiveness using site specific data and procedures consistent with the Gasco Consent Order (as was done in the Gasco EE/CA), including current conditions associated with existing upland groundwater source controls.

TOC Holdings Co.

The June 2016 FS neglects to include a discussion of upland source controls that have been implemented and the performance of those source controls in the remedial evaluations. The Time Oil groundwater plume identified in section 1.2.3.4 is fully controlled and meets JSCS values for all constituents other than potentially arsenic, which does not appear to be associated with site-related groundwater contamination.

EPA's application of E RALs in some but not all parts of SDU 3.5E results in the identification of a Sediment Management Area for PeCDD where the current SDU 3.5 SWAC already meets the most conservative PeCDD PRG of 0.0002 ppb for RAO2 (fish consumption on a river mile basis).[71] Therefore, no sediment remedy is necessary to achieve RAO2 in the relevant exposure area.

[70] Gasco Consent Order, p. 39
[71] See, e.g., Table 4.2-1 of EPA's August 2015 FS.

UPRR

The FS preferred alternative identifies two areas of sediments between RM 10 and 11 that EPA has identified for cleanup, purportedly due to exceedances of the PCB remedial action level ("RAL"). EPA also identified these areas on Figure 3.2-3 as containing principal threat waste. This area of the Site is near Union Pacific's railyard at Albina Yard. Union Pacific disputes this determination, particularly the area from approximately RM 10.7 to RM 11 where there are no exceedances of the applicable RAL in surface or subsurface samples of sediments.

EPA's potential cleanup area near RM 10.7 appears to be based on a PCB exceedance in soil at one location on a 900-foot stretch of the riverbank. EPA included riverbanks as part of its draft FS evaluation of alternatives, but did not identify Albina Yard as a site with "known contaminated riverbank" in section 1.2.3.5 of the FS.

Moreover, in its Final Remedial Investigation/Source Control Measures Evaluation Report for Albina Yard dated November 2010, which was reviewed and approved by Oregon DEQ, Union Pacific determined that the riverbank near Albina Yard had a low potential for erosion because it was highly vegetated and stabilized with rock/rip rap. Because PCB concentrations in the sediments are below the applicable RAL, and the riverbank is stable, this area of sediments should not be included as a potential cleanup area. Certainly, the FS contains no explanation for this area's inclusion as a potential cleanup area, much less as an area containing principal threat waste.